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UNDERGROUND DETENTION FACILITIES

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A. Design Considerations

1. Applicability

These specifications are appropriate for all underground pipe or vault detention, whether intended to detain channel protection volume, or temporarily store a portion of the water quality volume prior to releasing it to a quality BMP. Pipes or vaults may be located below vehicular or non-vehicular areas, and must be a minimum of 10-feet horizontally from other utilities. Underground detention is not acceptable in single family residential or townhouse developments.

2. Design Storm

The facility must be sized to provide storage for the required treatment volume, with safe conveyance of larger flows through the facility. The facility must be designed to safely pass a 10-year storm flow, at a minimum. Where the facility is located below a flow splitter, it must be sized to safely pass whatever portion of the 10-year event is delivered to it via the splitter.

3. Groundwater

In general, underground storage should not be located in areas of shallow groundwater. In situations where groundwater is encountered, additional design requirements may be necessary.

1. Geotechnical Analysis

Soil borings must be performed in the location of the proposed detention facility in order to determine presence and location of fill materials, rock, or groundwater. Borings must extend to a minimum of 2 feet below the facility.

B. Specifications and Details

1. Control Structure (for channel protection systems only)

The control structure shall be composed of concrete, and may be cast in place or precast. Precast structures must be monolithic, including the control weir. Structures must be designed for H-20 loading at a minimum. Structural computations, signed and sealed by the designing structural engineer, must be submitted concurrent with detailed plan review. Direct access to both sides of the control structure is required.

2. Overflow Weir Sizing Criteria

The overflow weir in the control structure must be designed to safely pass larger flows through the facility.

3. Low Flow Control Orifice

The low flow orifice may be no smaller than 2-inches in diameter without specific approval from DPS, and must be protected by a trash rack. Expanded metal or perforated half-round CMP must be used. All trash racks must be removable. The surface area of the trash rack perforations must exceed the low flow orifice area by a ratio of at least 5 to 1. For orifice sizes less than 3-inches in diameter, expanded metal or other special trash rack design will be required. CMP trash racks will not be allowed for orifice sizes less than 3-inches in diameter.

4. Storage Pipe

All storage pipes must be circular, and must be a minimum of 48-inches in diameter. Metal, HDPE, or concrete may be used. Crossover connections must be provided between storage pipes, and these must be a minimum of 48-inches in diameter, also. Pipes may not be closer together than ½ the inside pipe diameter, or 3-feet, whichever is greater. This dimension may be reduced when flowable fill is used. Minimum cover must be per the manufacturer's specifications, based on the design load and considering flotation where required. Ph and resistivity tests may be required on a case by case basis, wherever soil acidity is a concern.

a. Metal Pipe

Metal storage pipes must be aluminized, Type 2, and must be designed for the appropriate loading (pipes may not be less than 14-guage). Pipe ends must be matched and numbered by the manufacturer. Connecting bands must be corrugated, and sleeve gaskets must be used. All connections must be per the latest DPS band detail. A 24-inch connecting band and 24-inch flat neoprene or rubber sleeve gasket, with four rods and lugs, must be used for all pipe connections.

b. Concrete Pipe

Concrete pipe must meet ASTM C-361. Only circular pipe may be used. All pipe joints must be soil tight.

c. HDPE Pipe

High Density Polyethylene pipe is acceptable for use in underground storage facilities. Joints must be silt tight. Concrete manholes must be used at all HDPE pipe connections. Pipe installation must comply with ASTM D2321.

d. Concrete Vaults

Concrete vaults may be used for underground detention, with special design approved by the Department on a case by case basis.

5. Pipe Bedding

Bedding must extend a minimum of 6-inches below the invert of the pipe, and shall extend to the springline. Bedding stone shall be well graded granular material meeting AASHTO M-4. Flowable fill is also acceptable, with proper anchorage. For flexible pipe (CMP, HDPE), flowable fill must extend to the top of the pipe.

6. Access

All facility access manholes must be 30-inch diameter. There must be at least one manhole for every 100-feet of pipe. There must be a minimum of two manholes per pipe run. Where required, access ladders must be used, rather than manhole steps. Manhole covers must be bolted. Concrete manholes must be used for access to HDPE pipes. Manhole access is required at the terminal end of all pipe runs.